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GOVERNMENT OF INDIA

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MINISTRY OF DEFENCE

DIRECTORATE GENERAL OF QUALITY ASSURANCE

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QUALITY ASSURANCE INSTRUCTIONS

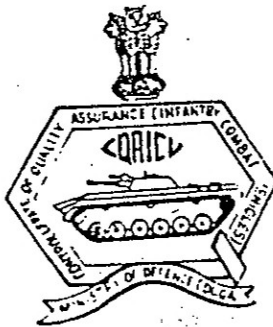
(PROVISIONAL)

No CQA (ICV) QAI/507

HEAD LIGHT QOF 127

DATE:- 070890

DRG No 765-82CB395



CONTROLLERATE OF QUALITY ASSURANCE

(INFANTRY COMBAT VEHICLES)

SECUNDERABAD

RESTRICTED

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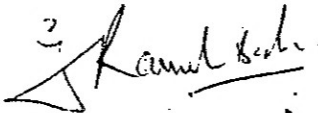
QUALITY ASSURANCE INSTRUCTIONS (PROVISIONAL)

NO. CQA-ICV/QAI/507

HEAD LIGHT #127

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SECUNDERABAD - 500 003

MAR 1990

QUALITY ASSURANCE INSTRUCTIONS

FOR

HEAD LIGHT φ127

1. INTRODUCTION :

This QAI deals with the inspection of Head Light φ127 to drawing No. 765-82-Cb 395 which is meant for illumination of the road at night with white light. This QAI is based on the relevant design documents, material specifications and other literature of the collaborators. This head light φ127 is included in the Hull Electrical system 675-82-C/4.

2. GENERAL INSTRUCTIONS FOR INSPECTION :

This QAI is issued to assist and guide inspector in his inspection and nothing in this instruction absolves the Inspector from his responsibility to ensure that the inspection is carried out strictly as per terms of contract and the accepted stores are as per drawings and the specifications quoted in the contract in every respect.

2.1. Before commencing inspection, the Inspector will make himself fully conversant with all the terms and conditions of the contract, including specifications, drawings and other literature of the collaborators.

2.2. The Inspector will ensure that the stores manufactured is in conformity with the relevant specifications and drawings quoted in the contract, with a view that the stores accepted are qualitatively meeting the service requirements.

2.3. In the course of inspection, if the inspector finds any points which could be included in this QAI he should bring such points to the notice of the AHSP.

2.4. The supplier may be shown this QAI in order to acquaint himself with the standard of inspection, so that he endeavours to improve his product.

Contd,..2/-

2.5. This QAI is the property of Government of India. It is liable for amendment at any time and should not be used unless authorised by Controller CQA-ICV, Secunderabad. For inspection purposes only the latest issue of this QAI will be made applicable and required number of copies of this QAI can be obtained from the issuing authority i.e., the Controller, CQA-ICV, 6th Floor, Chandralok Building, S D Road, Secunderabad - 500 003. Amendments issued by CQA-ICV from time to time shall be recorded in the amendment sheet enclosed.

2.6. Any technical queries on this QAI should be referred to issuing authority. For any departure from this QAI, the AHSP should be approached in writing and only after obtaining the written approval for the departure, the manufacture should commence production.

2.7. A set of applicable drawings and specifications will be forwarded to the manufacturer/supplier and the respective inspection authority on placement of supply order. For any changes in the drawings, specifications, standards or written text, prior approval in writing should be obtained from AHSP, before commencement of production. Equivalants of collaborators specifications with other international or national specifications and standards will be decided only by the AHSP.

2.8. The supplier should provide all standard test facilities for conducting inspection smoothly, viz., inspection gauges, instruments, test stands/rigs, fixtures, templates and also those recommended in the drawings, specifications. The supplier should maintain a calibration record sheet for all the measuring instruments/machines and gauges, which will be periodically checked by the inspector.

2.9. The supplier should take up suitable corrective measures immediately if any defects/short comings are noticed during line, process and assembly inspection.

In case the defects noticed on any consignment, are attributable to manufacturing defects warranting rectification of earlier supplies, the supplier should resort to rectification of these defects in the supplies already made in consultation with the AHSP and consignee.

3. CONSTRUCTION AND OPERATION :

Head light type ϕ 127, with a 28 V, 40 W filament lamp and black out device is used for illumination of the road at night with white light, observing the blackout measures. Quantity one per vehicle of this Head light is mounted in the Hull bow to the left.

3.1. Head Light consists of three main parts viz., Body, Lamp Unit and Blackout door. The blackout door is a metal stamped disk with a bead. The upper part of the disk has two narrow slots covered with visor. From below, the visor is covered with a shield that prevents the vehicle bow from being illuminated. The lower part of the disk is made in form of a cover, hinged upward and retained in the lower and upper positions by means of the spring loaded locks.

3.2. Head Light is connected to the vehicle mains through a receptacle. Switching "ON" of the head light is made by switch BO (Blackout Device) located on the instrument panel. This switch has two positions L & H corresponding to lamp filament reduced and full positions

3.3. The head light blackout door provides for three operating modes :

- i) Full blackout : When the lower lense is closed the lamp filament is reduced (Switch BO is in position L)
- ii) Partial Blackout : When the lower lense is closed and the lamp filament is full (Switch BO is in position H)
- iii) Full light : When the lower lens is open and the lamp filament is full (Switch BO is in position H)

4. BASIC PARAMETERS :

Type of Head Light : ϕ 127

Filament lamp

Type : TH 28-40

Voltage : 28 V

Power : 40 W

Intensity of light in cd

i) In the blackout door : 1000 cd Maximum
closed condition

(should be directed at
angle from $2^{\circ} 30'$ to 5°
below horizontal axis)

1500

ii) In blackout door opened: 1500 cd Maximum
condition

Type of connection : Single wire

Mass : 2.64 Kg.

Head light is liable for storage, transportation and operation in the environments of tropical, tropical sea coasts, dry deserts and cold climates. The environmental temperature is -50°C to 40°C relative humidity up to 98%.

5. QUALITY ASSURANCE PROVISIONS :

5.1. INSPECTION RESPONSIBILITY :

The supplier is responsible for satisfactory performance of the item during usage and for performance of all inspection requirements specified herein.

5.2. The supplier should carry out 100% pre-inspection before offering the items to the inspector for inspection. A test certificate indicating all the tests carried out by the supplier should be given to the Inspector/AHSP while tendering the stores for inspection. The contractor should provide free access for scrutiny of all the documents to the Inspector/AHSP in order to ensure that the items offered are of the highest quality.

5.3. SUPPLY OF LITERATURE

The supplier should provide sufficient copies of the literature of the items, such as illustrated parts-list, operating instruction, assembly schedule, maintenance/overhaul instructions, systems layout, charts list of indigenous materials etc; to the AHSP for vetting and distribution.

6. PILOT/BULK INSPECTION :

6.1. Contractor should tender 6 pilot samples representing the bulk supplies to the inspecting officer for the pilot samples evaluation. The pilot samples tendered should bear the regular serial number in addition to the identification number in red paint as under :

PS₁, PS₂, PS₃,... PS₆.

6.2. All inspection/testing facilities for evaluation of pilot samples will be provided by the supplier at supplier's premises. The supplier should inform in advance in writing about the facilities available with them for evaluation of pilot samples. Any additional test facilities required for pilot sample evaluation will be intimated by the inspecting officer and the AHSP. Vehicle trials will be conducted as per the directions of the AHSP.

6.3. All bought out articles like Glass, Holder, etc; will be inspected by the Inspection officer, if considered necessary. Inspection officer will also conduct stage inspection during manufacture, if necessary.

6.4. Pilot samples will be considered for acceptance only after completion of all tests indicated herein. Bulk production clearance will be accorded by the AHSP only after the approval of pilot samples. Inspection of pilot samples and bulk supplies of the item shall be carried out in accordance with this QAI and relevant drawings/specifications.

6.5. Disposal of pilot samples will be intimated by the AHSP to all concerned. Inspector should punch, stamp or stencil the acceptance (V↑ mark) on the body of the Head Light if it complied with the requirement of this QAI in all respects. Inspector should ensure that any repairs/rectifications carried out on the items are within the acceptable limits and will not impair the performance and also complies the requirements given in this QAI. All samples rejected during the inspection should be punched, stamped or stenciled with the rejection mark (R↑ mark) distinctly on the body of the Head Light to avoid mixing of the same with the accepted stores.

7. METHOD OF INSPECTION :

The inspection requirements and procedure for quality assessment of the item are given as under:*

Srl. No.	Description of the test to be carried out	Sampling Size	
		Pilot	Bulk
1.	Visual Inspection and checking of mounting dimensions	100%	100%
2.	Materials	One set of test bars against each material specification	One set of test bars against each material specification per lot.
3.	Production line inspection of individual components	100%	10%
4.	Assembly inspection	100%	10%

Contd...7/-

Srl. No.	Description of the test to be carried out	Sampling Size	
		Pilot	Bulk
5.	Weight	100%	10%
6.	Illumination test (candle power test)	100%	10%
7.	Insulation resistance test	100%	10%
8.	Electrical insulation strength test.	100%	10%
9.	Vibration and impact strength test 2 Nos.		2 Nos. per lot of 100 Nos.
10.	Air tightness test	-do-	-do-
11.	Cyclic temperature variation effect test	-do-	-do-
12.	Wet strength test	-do-	-do-
13.	Effect of sea salt fog	-do-	-do-
14.	Test for the efficiency of head light when plunged in to the water	-do-	-do-
15.	Test for interchange ability	-do-	-do-
16.	Fitment/performance trials	-do-	-
17.	Preservation/packing/identification check	100%	100%

The details of various tests mentioned above are explained below :-

7.1. VISUAL INSPECTION :

Head light ϕ 127 is subjected for the following checks

- 172 71 156 SB1
- ↓
- i) Completion of the assembly as per the main assembly drawing No. ϕ 127-3711.000 CB
 - ii) Mounting dimensions as per the out line drawing No. ϕ 127-3711.000 CY

Contd... 8/-

- iii) Quality of external finishing/coating
- iv) Mechanical damages/defects.
- v) Correctness of marking.
- vi) Rattling of glass.
- vii) Soldering of terminals.

*1) Proper marking
marking board
2) Free opening and closing
of cover of block and
with air lock*

7.2. MATERIALS :

Raw material used in the manufacture of each component shall conform to the specifications mentioned in the relevant drawings. Manufacturer shall make available to the inspector all records pertaining to the raw materials used in the assembly. The raw materials shall be counter checked with relevant specifications. Test specimen and test bars representing the pilot/bulk shall be drawn from the component production line and tested for chemical composition and mechanical properties. Results shall be within the specified limits. Material test specimen for insulating varinishes, adhesives, insulating tapes, solders and paints, etc: shall be drawn at random and tested at recognised laboratories/test houses.

7.3. PRODUCTION LINE INSPECTION OF INDIVIDUAL COMPONENTS

Detailed dimensions of all components shall be checked as per the drawing before the assembly. Any special parameters/checks indicated in the drawing like hardness, heat treatment, surface finish, protective coating, dimensional tolerance shall also be checked at this stage. The components shall also be checked for presence of defects like cracks, dents, burrs, under cuts metallic impurities, flashes, etc.,

7.4. ASSEMBLY INSPECTION

All assemblies shall be checked for dimensions as per the drawing. Any special paramenters given in the drawing like hardness, heat treatment, surface finish, protective coating, etc., shall be checked. All assemblies shall be

examined for presence of defects like improper assembling, defects in soldering/brazing, loose parts/fasteners, etc.

7.5. WEIGHTMENT :

Weight of each component shall be controlled during production line in such a way that the total weight of each Head Light shall be within 2.64 Kg. \pm 2%.

7.6. ILLUMINATION TEST :

Illumination tests are carried out as given below :

7.6.1. Light intensity is measured by lux-meter, its photocell should be at a distance of 6m from head light under test.

7.6.2. Head Light with black out door is mounted such that the top edge of light beam (shade of visor) would be arranged horizontally. Coordinates at check points of light spots are determined from two mutually perpendicular axes vertical and horizontal.

7.6.3. The centre of light spot is determined by luxmeter. Vertical line passing through centre of light spot is called vertical axis. Horizontal line passing over the top edge of light spot through spot on vertical axis having a light intensity at 30 Cd is called horizontal axis.

7.6.4. Head Light is considered acceptable if the following requirements are met.

i) BLACK OUT DOOR CLOSED

The max light intensity should be directed at angle from 2°30' to 5° below the horizontal axis and should not exceed 1000 Cd.

ii) The light intensity at check points, should correspond to the following characteristics

Angle		Minimum Light intensity Cd.
Vertical	Horizontal	
3° downwards	0°	300
4° 30' downwards	0°	300
5° downwards	20° to the left and 20° to right	30

ii) BLACK CUT DOOR OPENED :

15000 Max intensity of light should not exceed 1500 Cd. Scattering angle should be in vertical plane 5° above max and 4° below minimum and in horizontal plane total scattering angle for head light should be 30° minimum.

Note : The angle within the limits of which the luminous intensity decreased to 0.1 of its max value is called scattering angle.

// 7.7. INSULATION RESISTANCE TEST :

Head Light without lamp is placed in a hydrostat with relative humidity of 98%-3% for 24 hours. Insulation resistance of current carrying parts is measured at 500 V DC by megger.

7.7.1. The Head Light is considered to have passed this test if the resistance measured is 2 mega ohms minimum.

7.8. ELECTRICAL INSULATION STRENGTH TEST :

① Electrical insulation strength of current carrying parts of Head Light is checked in 50Hz, 220 V, AC current. During this test AC is fed to the body of head light current carrying parts and Voltage is increased gradually. There should not be insulation break down for 1 minute minimum.

Note : Insulation resistance and electrical strength tests should be conducted within 10 minutes of removal of head light from hydrostat.

7.9. VIBRATION AND IMPACT STRENGTH TEST :

These tests are carried out by mounting the Head Light on the stand, in operating position. Head Light should with stand the vibration loads with acceleration of 5g within frequency range of 10 to 50 Hz. Vibration strength is tested with acceleration of 5g to frequency 50 Hz. for 8 hours. Head light should be impact resistant when subjected to impact load with acceleration of 15g and duration of impulse from 10 to 15m sec with frequency of impacts from 80 to 100 per minute. Total number of impacts during the test should be 2000.

7.10. AIR TIGHTNESS TEST :

Head Light is checked for water proofness by dipping an unpowered head light in working position in to chamber filled with water. Excess pressure of water of 0.7 atm gauge is developed in the chamber.

7.10.1 Head Light should remain under excess pressure in the chamber for two hours. Test results are considered satisfactory if water is not observed inside optical element. Seepage of water inside the body of head light is allowed upto 1 cc max.

7.11. CYCLIC TEMPERATURE VARIATION TEST :

In this test Head Light in OFF condition is subjected for 3 cycles of temperature variation continuously one after the other in the following sequence. In each cycle Head Light is placed in cold chamber with temperature already brought down to - (minus) 40°C and maintained at this temperature for 4 hours. The head light taken from the cold chamber is placed in hot chamber with temperature of 65°C and held at this temperature for 4 hours. The transfer time for articles from cold chamber to hot chamber and vice versa should not exceed 5 minutes.

7.11.1. The head light should operate efficiently after cyclic temperature variation test.

7.12 WET STRENGTH TEST :

Head Lights are tested for wet strength by placing in hydrostat at ambient temperature of $25 \pm 10^{\circ}\text{C}$ and humidity upto 98% for 48 hours.

7.12.1. Internal volume of hydrostat should be big enough to accomodate 3 head lights. Head Light is placed inside the chamber on a grid support. Head Light is kept in hydrostat for 48 hours. Head Light is checked for performance without preliminary drying. Head Light should function efficiently.

7.13 TEST FOR THE EFFECT OF SEA SALT FOG :

This test is conducted in order to determine the corrosion resistance of Head Light in an atmosphere saturated with aqueous solution of salts.

7.13.1 The Head Lights are placed in the chamber such that during the test, the spray of solution does not fall on the lights directly. The spray is formed by atomising the salt solution with a centrifugal aerosol apparatus or a pulverizer or by any other method. The solution is prepared by dissolving sodium chloride pure for analytical purposes in distilled water, with a concentration at 33 ± 3 grams per litre. The mist must have a dispersion of 1 to 10 microns and a water content of 2 to 3 grams per cubic metre. The solution is sprayed for 15 minutes at intervals of 45 minutes. The temperature in the chamber must be $27 \pm 2^{\circ}\text{C}$. The total duration of test is 10 days. On completion of test, the head lights are cleaned by washing with distilled water and dried.

7.13.2 The Head Lights are considered to have passed the test if there is no formation of rust on the head lights.

7.14. TEST FOR EFFICIENCY OF HEAD LIGHT WHEN PLUNGED IN TO WATER

The head light is switched on at normal operating voltage. After attaining steady state thermal condition the

head light in ON condition will be plunged in to the water having temperature of 15°C and kept in the water for 30 minutes. Head Light should maintain its servicability after the test.

7.15 TESTING FOR INTER CHANGEABILITY:

Assemblies/components of head light should be interchangeable assembly wise/component wise. Selective assembly is not permitted. Two head light assemblies selected at random shall be stripped completely and checked for inter changeability. Both the head lamps will be assembled after interchanging the components/assemblies and assembled Head Lights are subjected to the tests 6 to 10 of para 7 above.

7.16. FITMENT/PERFORMANCE TRIALS :

Head Light is fitted in the location indicated in para 3 above and its performance will be checked.

7.17. PRESERVATION/PACKING IDENTIFICATION :

Plating, painting preservative coating shall be in conformity with the specifications quoted in the relevant drawings.

7.17.1. The following identification marks shall be marked on the body of the head light :

- (a) Designation and type.
- (b) Manufacturers Symbol.
- (c) Supply Order No. and date.
- (d) Drawing No.
- (e) Serial No. and date of manufacture.

7.17.2. Each unit should be separately packed by the vendor so that it is protected from moisture and dust. The units can be packed in a box, which shall withstand transportation/storage before their consumption in the assembly. A label indicating the following identification marks shall be pasted to the packing box.

- (a) Manufacturers Trade mark.
- (b) Type of head light.
- (c) No. of head lights.
- (d) Supply Order No. and date.
- (e) Technical Specification No.
- (f) Inspector's mark.
- (g) Consignee

8 GUARANTY :

The manufacturer has to furnish the following certificate as under :-

"The guaranteed life of head light is 500 operating hours of operation on the vehicle"